A Road Sign Detection and Recognition for Driver Assistance Systems using Raspberry pi

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Abstract : This paper explores the effective approach of road sign detection and recognition for driver assistance systems (DAS). In today's world road conditions drastically improved as past decade. Express highways equipped with increased lane size made up with cement concrete. Obviously speed of the vehicle also increased. Based on the driver point of view there might be chances of neglecting mandatory road sign while driving. Our proposed system to help driver about the road side detection to avoid road accidents. The automatic road sign recognition is an important part of driver assisting systems which helps driver to increase safety and driving comfort. This road sign recognition system is to be divided into two parts, the first part is detection stage which is used to detect the signs from a whole image and the second part is classification stage that classifies the detected sign in the first part into one of the reference signs which are present in the data set. Using RFID (radio frequency identification detector) we insert the RFID card in the road signs boards that it detects road sign by using the bar code of the RFID. Then drive will receive the road sign information with help of RFID receiver. The extensive experimentation has shown that proposed system approach is robust enough to detect and the recognize road signs under varying lighting, rotation and translation condition.

***IndexTerms*- RFID, traffic lights recognition, road signs detection, Driver Assistance System (DAS)**

I. INTRODUCTION

Safety features are designed to avoid collisions and accidents by offering technologies that alert the driver to potential problems or to avoid collisions by implementing safeguards and taking over control of the vehicle. Adaptive features may automate lighting, provide adaptive cruise control, automate braking, incorporate GPS/ traffic warnings, connect to smart phones, alert driver to other cars or dangers, keep the driver in the correct lane, or show what is in blind spots. There are many forms of ADAS available; some features are built into cars or are available as an add-on package. Also, there are aftermarket solutions available. Additional inputs are possible from other sources separate from the primary vehicle platform, such as other vehicles, referred to as Vehicle-to-vehicle (V2V) or Vehicle-to-infrastructure such as mobile telephony or Wi-Fi data network systems.

Automatic traffic sign detection and recognition, as an important task of Advanced Driver Assistance Systems, has been of great interest in recent years. The road signs are typically placed either on a roadside or above the roads. They provide important information regarding to guiding, warning, or regulating the behaviors to drivers in order to make driving safer and easier. The main purpose of driving assistance systems is to collect significant information for drivers in order to reduce their effort in safe driving. Drivers have to pay attention to various conditions, including vehicle speed and orientation, the distance between vehicles, passing cars, and potential dangerous or unusual events ahead. If driver assistance system.

Automatic High Beam Assist is one of the features of ADAS (Automatic driver assistance system). The system automatically changes the light from high beam to low beam based on traffic in-front. High beam will be selected when there is no other vehicle within the range and low beam will be selected when it detects other vehicle. The system controls the headlights by collecting the information from various sensors placed on the chassis of the vehicle. Communication between them will be carried through CAN protocol.

II. EXISTING SYSTEM

A. Detection Module

Now the captured images are given to the detection module. The main work of the detection module is to segment the input captured image and extract out the areas and contain road sign patterns and then passed to the classification module. The proposed algorithm uses the color properties of the road sign in order to identify the interested region that is actual road sign.

B. Classification Module

The main aim of classification module is to classify the extracted regions to its input to the road sign database. The final reduced and normalized regions of any road sign image have been directly used as the input vector of a neural network classifier. The regions of the image containing potential road sign patterns are extracted such as shape and color with the help of ANN and then it is fed to the classification module. Classification module further process the extracted road sign patterns and identify the actual road sign they represent with the help of PCA. The PCA extracts the features of the captured road sign image by comparing with slandered dataset which are already stored in the system.

III. PROPOSED SYSTEM

The main aim of the system is to detect and recognizing clear image of the road signs to the driver regularly. In this system which consists of active RFID (Radio Frequency Identification), transmitter, receiver, LCD (Liquid Crystal Display) display, voice assistance using Raspberry pi and this information will send to the driver of the vehicle. High beam control technology is also used in these systems.

The system automatically switches between high beam and low beam to ensure excellent forward visibility during night time driving. The proposed systems require developing of transmitter/receiver (Tx/Rx). This system makes driving safety and driver information of his route. Fig:1 shows the proposed system block diagram. Here the active RFID Rx, LCD Display, voice processor, auto dip dim for high beam control, SCU are connected to the Raspberry pi Zero module kit. The RFID transmitter tag is insert in the road sign board. Finally the device is connect to the vehicle.

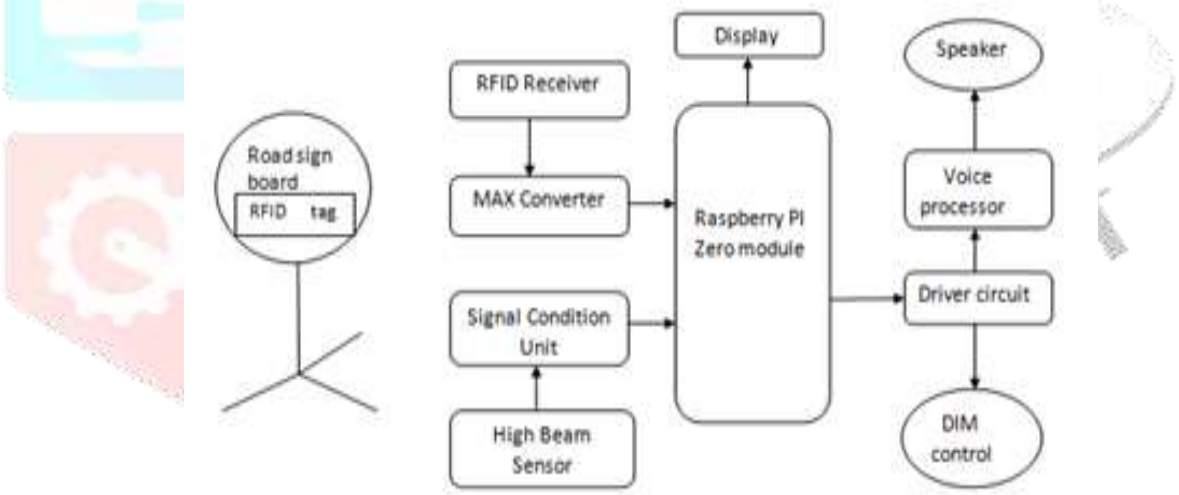

Fig.1 Block diagram of Proposed System

IV. EXPERIMENTAL SETUP AND RESULTS

A. Low beam sign detection

In normal condition, the sensor will detect the low beam sign and it will be shown in LCD display. This experimental setup and results are shown in figure 2.

B. High beam sign detection

In high beam state, the sensor will detect the high beam sign and it will be shown in the LCD display. This experimental setup and results are shown in figure 3.

C. Narrow road sign detection

If road sign is detected, the RFID transmitter tag sends the data to RFID reader**,** then the RFID receiver receives narrow road sign and it will be shown in the LCD display. This test experimental setup and results are shown in figure 4.

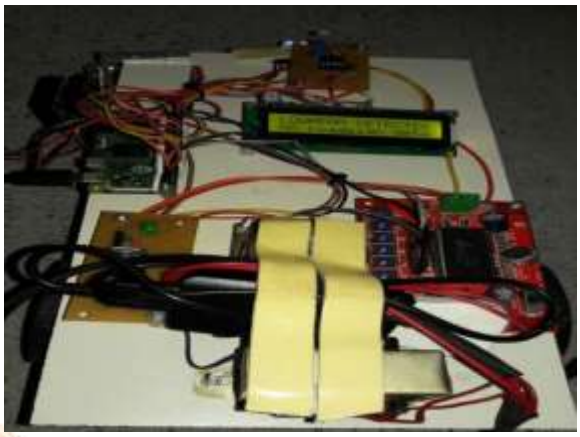

Fig.2 Low beam sign detection setup and results

Fig.3 High beam sign detection setup and results

D. No entry sign detection

If road sign is detected, the RFID transmitter tag sends the data to RFID reader**,** then the RFID receiver receives **no entry sign** and it will be shown in the LCD display. This test experimental setup and results are shown in figure 5.

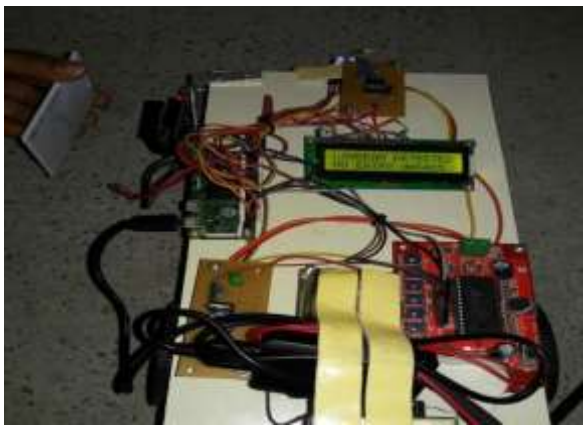

Fig 4 & 5: Results of narrow road sign and No Entry sign Detection

E. speed breaker sign detection

If road sign is detected, the RFID transmitter tag sends the data to RFID reader**,** then the RFID receiver receives speed breaker sign and it will be shown in the LCD display. This test experimental setup and results are shown in figure 6.

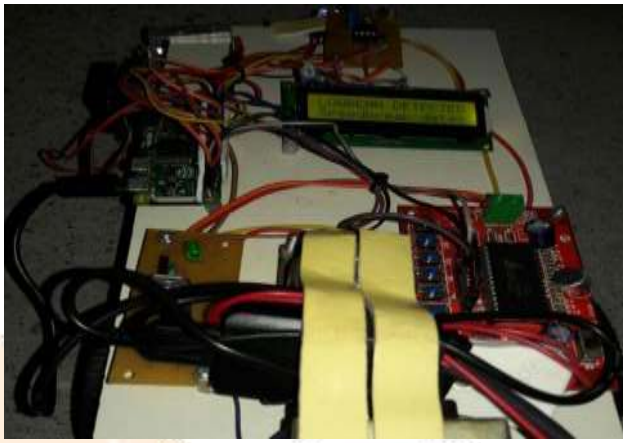

Fig 6 Speed Breaker sign Detection

V. CONCLUSION

This system is designed to assist driver and road signs (symbol) displayed on the in-car system. Along with that a pre-recorded sound also played, so that driver no need to see the LCD regularly and he can drive concentrate. As the road side boards can also solar operated so that the system will not be interrupted and gives continues performance. This also makes need of maintenance will be minimized. This system is much helpful for driver in hilly-areas and unknown places. If the system was implemented means, it can provide more applications such as text reorganization on the road side boards.

The system performance is satisfactory for head lights (detection range up to 300–500m) but on the other hand, the performance for tail lights (detection range up to 50–80m) must be improved. This device provides high beam when no vehicle is detected, and again switches to low beam when it detects any vehicle in-front automatically by reducing the road accidents.

VI. FUTURE WORK

In future we can implement by high frequency RF method, it will detect next road sign before you reach that point about 1 km. Using high beam sensor we will detect the high beam light and its recognized the two or more vehicle at a time. After recognized our system will reduce the high beam light to low beam by means automatically. We can update the read sign from cloud database through internet.

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